EXHIBIT A

UNITED STATES PATENT 5,280,371
JOINT CLAIM CONSTRUCTION CHART
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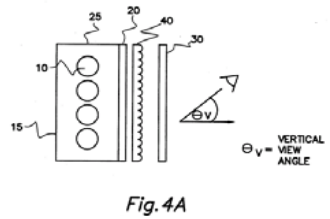
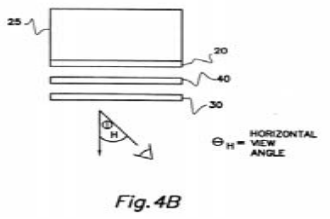
Claim Language*	**Honeywell's Construction**	**Manufacturer Defendants' Construction**
A display apparatus comprising:	A display apparatus is a direct view LCD module. *See, e.g.*, Col. 2, ll. 51-55: . . . liquid crystal panel comprised of a number of individual liquid crystal elements which are alternatively energized in order to form a desired pattern image for viewing from the front of the liquid crystal display. File History p. 60 - Amendment and Response to Office Action dated February 2, 1993, p. 3 (distinguishing between projection apparatus and direct view displays); Figs. 4A and 4B.  Fig. 4A  Fig. 4B The term comprising signifies that this claim is open-ended; it is not limited to only the recited claim elements, but covers an apparatus that contain additional unclaimed components.	A liquid crystal display (LCD) module, i.e., the light source, lens arrays and liquid crystal panel. *See, e.g. Col. 1 line. 63 - col. 2 line 1 (SUMMARY OF THE INVENTION).*
a light source;	A light source for illuminating the claimed liquid crystal panel. *E.g.*, Lamp 10 (Figs. 1, 2, 4A, 7 and 10); Col. 5, ll.	A source of distributed light. *See col. 2 lines 46-51; col. 3 lines 24-29. Figs. 1 and 2.* *Referring now to FIG. 1 there is shown a cross section of a typical prior art liquid crystal display*

**Disputed claim limitations are underlined.*

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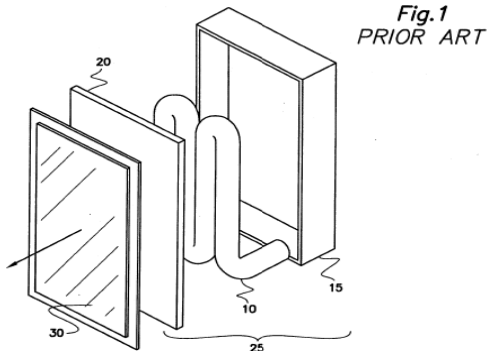
	34-38: This allows the reduction of the thickness or optical density of the conventional diffuser while still achieving the same system luminance uniformity and masking of undesired spatial artifacts from the light source, but with higher luminance at the output. File History, p. 53 - Office Action, dated September 30, 1992, p. 2 referencing lamps in Abileah '783 patent ("Abileah et al teach a light source 100. . .".	*apparatus including backlight array 25 comprising lamp 10, rear reflecting surface 15 and lambertian diffuser 20.* ***The backlight array provides a source of light*** *which impinges on liquid crystal panel 30* *Col. 2 lines 46-51.* ***The apparatus of the present invention includes the backlight array and liquid crystal of the prior art as shown in FIG. 1*** *with the addition of a lens array 40 inserted between the lambertian diffuser 20 of the prior art and liquid crystal display panel 30, as shown in FIG. 2.* *Col. 3 lines 24-29.* 
a liquid crystal panel mounted adjacent to said light source for receiving light from said light source; and	A liquid crystal panel is mounted near the light source and receives light from the light source.	Defendants agree with Honeywell's construction of this limitation.

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first and second lens arrays, each having a plurality of individual lenslets,	A lenslet is a light-refracting structure. *E.g.*, Col. 3, ll. 60-63. A lens array is a structure that contains a pattern of independently operating light refracting structures (lenslets). *E.g.*, Fig 7, Els. 42 and 44; Fig. 10, El. 80; Figs. 2 and 6, El. 40; Col. 5, ll. 6-15: It was also discovered that the maximum increase in luminance was obtained using a triangular lens array having an included angle of 90° as illustrated in Fig. 10. This configuration resulted in a variation of luminance with vertical and horizonal viewing angles which was quite steep as illustrated by curves 160 and 170 of Fig. 11. Other lens array shapes may be selected as desired to obtain the required concentration of luminance and variation of luminance with vertical and horizonal viewing angle for a particular application. *See also* File History, pp. 33-34 - Original Application, dated July 7, 1992, claims 1-3 and 6.	**I)** Two lens arrays each consisting of a member separate from the light source and having a plurality of lenslets. *See col. 1 line 67 - col. 2 line 3; col. 3 lines 24-52; Figs. 2, 4A, 4B, 6, 7, 10.* **II)** The lens arrays are arranged such that the lenslets on the first and second lens arrays: **a)** face toward the liquid crystal panel (*See col. 2 lines 15-18, 22-40; col. 3 lines 50-56; col. 4 lines 46-58; col. 5 lines 6-12; Figs. 2, 4A, 5 - 11*); **b)** are parallel to each other, and parallel to the horizontal axis of the liquid crystal panel (aside from any "slight misalignment") (*See col. 1 lines 33-39; col. 1 line 62 - col. 2 line 3; col. 2 lines 32-33; col. 3 lines 1-14; col. 4 lines 26-34; col. 4 line 52 - col. 5 line 5; Figs. 7, 8*); **c)** have different pitches from each other and from the liquid crystal panel (*See col. 4 lines 26-45; col. 4 line 59 - column 5 line 5; Fig. 7*); and **d)** provide a variation of light transmission with vertical viewing angle. See col. 1 lines 33-39; col. 1 line 62 - col. 2 line 3; col. 4 lines 52-58; Figs. 2, 4A, 6, 7, 10. Exemplary Intrinsic Support for **I)**: *The foregoing and other objects are achieved in the present invention wherein there is provided …**one or more directional diffuser lens arrays disposed***

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		between the light source and the liquid crystal array*....* *Col. 1 line 62 - col. 2 line 1 (SUMMARY OF THE INVENTION).* *The apparatus of the present invention includes the backlight array and liquid crystal of the prior art as shown in FIG. 1* ***with the addition of a lens array 40 inserted between the lambertian diffuser 20 of the prior art and liquid crystal display panel 30****, as shown in FIG. 2. It was found that* ***by inserting a directional diffuser consisting of a cylindrical lens array 40 between the lambertian diffuser and the liquid crystal panel*** *that both of the desired effects could be accomplished.* … *For example, FIG. 5 illustrates that with* ***the insertion of lens array 40*** *as shown in FIGS. 4A and 4B ….* … *The effect which results* ***from the insertion of the cylindrical lens array*** *is explained by reference to FIG. 6…* *Col. 3 lines 24-52.* Exemplary Intrinsic Support for **II)a:**

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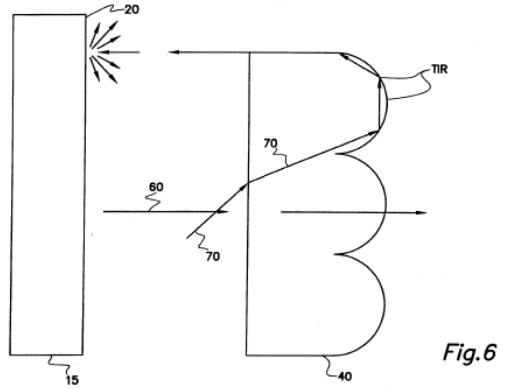
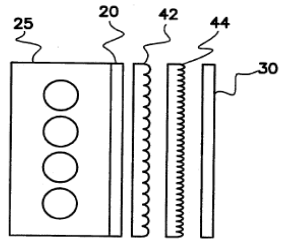
		 Fig.6 *The effect which results from the insertion of the cylindrical lens array is explained by reference to FIG. 6* ***wherein there are shown light rays from the lambertian … source diffuser*** *impinging on the lens array from various angles.* *Col. 3 lines 50 - 54.* Exemplary Intrinsic Support for **II)b**:  Fig. 7 Exemplary Intrinsic Support for **II)c**:

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		For the desired specific implementation it was discovered that ***the adverse interaction producing moire patterns could be eliminated by including a second lens array with a different number of lenses per inch. The combination of the dual lenses*** *increased the desired reduction in luminance with increased viewing angle, and in addition* ***reduced or eliminated the moire patterns with the selection of an appropriate pitch, or number of lenses per inch, for the two lenses*** *in question.* *As illustrated in FIG. 7, one of the lens arrays 42 was selected to have a relatively coarse pitch with respect to that of the liquid crystal display and the second lens array 44 was selected to have a relatively fine pitch with respect to that of liquid crystal display.* … *In addition, since* ***moire effects result when both of the lens arrays have the same spatial frequency****, the rear array 42 should have a coarse resolution or low spatial frequency while the front lens array 44 should have a fine resolution or high spatial frequency.* ***The lens arrays and the panel spatial frequencies should be selected to avoid integral multiples of the other.*** *Col. 4 lines 26-65.*

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		Exemplary Intrinsic Support for **II)d**: *In certain applications, such as for example an aircraft cockpit,* ***the typical vertical viewing angle is fixed within a relatively narrow range and it would therefore be desirable to concentrate a higher percentange of the energy from the light source within a particular range of viewing angles****.* *Col. 1 lines 33-39.* *The foregoing and other objects are achieved* ***in the present invention*** *wherein there is provided a liquid crystal display apparatus…****for providing a tailored variation of luminance from the liquid crystal display as a function of vertical viewing angle****.* *Col. 1 line 62 - col. 2 line 3 (SUMMARY OF THE INVENTION).* ***For the particular application in question the preferred embodiment*** *included two lens arrays in series which* ***provided the best tradeoff of decrease in luminance with variation of vertical viewing angle, while not adversely affecting the variation in luminance with horizonal viewing angle.*** *Col. 4 lines 52-58.*
disposed between said light source and said	No Construction Necessary	Positioned between the light source and the liquid crystal panel, with a purposeful and defined air gap at

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liquid crystal panel		the interface of the light source and the one of the lens arrays closest to the light source. *See col. 3 lines 26-28, 55-56; col. 4 lines 4-16; Fig. 6, and originally filed Fig. 6:* ***An air gap must be present*** *at the interface of the lambertian diffuser and the lens array.* *Col. 3 lines 55-56.*
for providing a predetermined variation with viewing angle of light transmission from said light source through said lens arrays and said liquid crystal panel,	The lens arrays provide a variation of light transmission with viewing angle; as a result of the arrays, the transmission of light through the liquid crystal panel varies with the angle from which the panel is viewed. *See e.g.*, Col. 1, ll. 8-10, 36-45, 48-61: . . . a liquid crystal display (LCD) having a directional diffuser to provide a tailored variation of luminance with viewing angle. * * * . . . it would therefore be desirable to concentrate a higher percentage of the energy from the light source within a particular range of viewing angles. It would therefore be desirable to provide a directional diffuser for use with a liquid crystal display to provide a tailored variation of luminance with viewing angle while also providing a	See II(d), *infra*.

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	concentration of the light energy from the light source within a predetermined range of viewing angles. * * * It is therefore an object of the present invention to provide a directional diffuser element for a liquid crystal display to provide a tailored variation of luminance with viewing angle. It is a further object of the present invention to provide a liquid crystal display having less variation of intermediate gray-level luminance with viewing angle. It is still further an objection of the present invention to provide a liquid crystal display combining the above features to provide a higher concentration of light energy, and therefore increased luminance, within a particular range of viewing angles thereby providing a more efficient use of light energy available from a light source. *See also*, Col. 3, ll. 19-24: It would therefore be more energy efficient if a substantial portion of the light energy could be redirected so as to be concentrated in the viewing angles of	

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	interest for a particular application. *See,* Col. 3, ll. 60- Col. 4, l. 16: Those rays that are normal to the source diffuser but less than the critical angle within the lens array are passed through the lens array materially unobstructed, except for a small amount of surface reflection. Rays which enter at oblique angles and are greater than the critical angle of the lens array undergo total internal reflection at the inside of the lens surface as illustrated by ray tracing 70. These rays are reflected with no loss due to the total internal reflection effect around the lens periphery. They exit the rear of the lens array and return to the source diffuser where they undergo a secondary diffuse reflection from the source diffuser. However, because the source diffuser is not totally reflective, some of the returned rays are transmitted through the diffuser and are then reflected from the backlight enclosure surface 15 of Fig 4A. Some fraction of these rays are reflected internally to exit the diffuser again. These reflected rays again have a lambertian distribution at the surface of lambertian diffuser 20. It is apparent from this interaction between the lens	

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	array and the backlight that rays which impinge close to the normal tend to be intensified while those rays which impinge at oblique angles undergo total internal reflection and are returned to the diffuser and diminished somewhat from this statistical process. Col. 5, ll. 6-15: It was also discovered that the maximum increase in luminance was obtained using a triangular lens array having an included angle of 90° as illustrated in Fig. 10. This configuration resulted in a variation of luminance with vertical and horizonal viewing angles which was quite steep as illustrated by curves 160 and 170 of Fig. 11. Other lens array shapes may be selected as desired to obtain the required concentration of luminance and variation of luminance with vertical and horizonal viewing angle for a particular application.	
wherein at least one of said first and second lens arrays is rotated about an axis perpendicular to said liquid crystal panel in order to provide a slight misalignment between	A slight misalignment is a misalignment of typically 2-16 degrees between an axis of the lens array and an axis of the pixel arrangement in the liquid crystal panel. *See e.g.*, Col. 5, ll. 21-28: This residual moiré can be removed by rotating the lens array 40 with the	One or more of the lens arrays is intentionally rotated at an angle of not less than 2 degrees and not more than 16 degrees in relation to the horizontal axis of the liquid crystal panel. *See col. 2 lines 40-42; col. 5 lines 16-28; Fig. 12.* *FIG. 12 shows the angular rotation of the lens array* ***with respect to the LCD matrix array*** *to*

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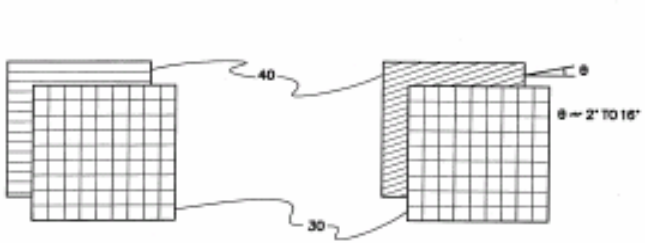
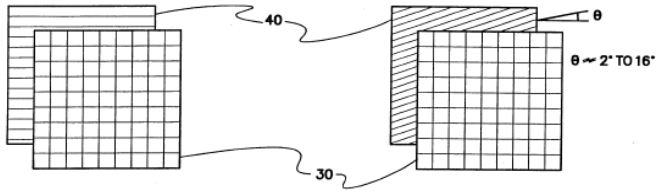
said lenslets and said liquid crystal panel.	respect to the LCD array 30, as illustrated in Fig. 12. This rotation of the lens array by a few degrees (Typically 2 to 16 degrees) from the horizontal axis causes a small change in the effective spatial frequency difference of the two arrays and thereby eliminates the residual moiré. Fig. 12:  Fig. 12 ; File History, pp. 33 & 35 - Original Application, dated July 7, 1992, claims 1-3 and 9.	*eliminate residual moiré effects.* *Col. 2 lines 40-42.* *This residual moire can be removed by rotating the lens array 40* ***with the respect to the LCD array 30****, as illustrated in FIG. 12.* ***This rotation of the lens array by a few degrees (Typically 2 to 16 degrees) from the horizontal axis*** *causes a small change in the effective spatial frequency difference of the two arrays and thereby eliminates the residual moire.* *Col. 5 lines 21-28.*  Fig. 12

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